

How does the olfactory information input to the hippocampal and amygdaloid network?

Riichi Kajiwara

Biomed. Res. Inst., AIST

Olfactory information from the piriform cortex (PC) is relayed to the amygdala and the hippocampus via two parallel pathways. One of which is via the amygdaloid cortex (AC) and the other is via the entorhinal cortex (EC). Since these olfactory cortices are located in ventral part of the brain, it is difficult to analyze the neural propagation pattern under *in vivo* conditions. For studying these olfactory cortices, the use of the isolated whole brain *in vitro* preparation is one of the ideal methods. By imaging voltage-sensitive dye signals in the isolated whole brain, we can monitor the spread of neural activity. In fact, physiological connections among the olfactory cortices (PC, EC, and AC) were successfully investigated in our laboratory. In the more recent study, we suggested that the AC and EC represent functionally coupled structures in the olfactory stream of information (Kajiwara et al. *Eur J Neurosci* 2007). However, stimulus frequency dependency, plasticity, and other neural network properties of the olfactory system are still not well understood. In the present study, we stimulated olfactory nerves repetitively at theta frequency (10Hz), and investigated the change of the spatio-temporal pattern of evoked neural activities in the olfactory cortices. And it was found that the neural activities propagated from the EC to the AC were enhanced under the influence of the repetitive stimulation to the olfactory nerves.